PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-321381

(43)Date of publication of application : 03.12.1996

(51)Int.Cl. H05B 33/14
C09K 11/06

(21)Application number : 07-152139

(22)Date of filing : 26.05.1995

(71)Applicant : CHISSO CORP

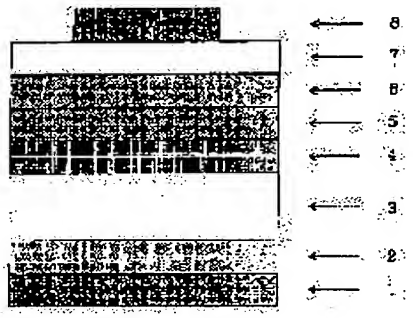
(72)Inventor : FURUKAWA KENJI
UCHIDA MANABU
IZUMISAWA YUSHO

(54) ORGANIC ELECTROLUMINESCENT ELEMENT

(57)Abstract:

PURPOSE: To provide an easy-to-watch organic EL element by keeping reflected light from a rear cathode, so as not to be transmitted outside via the installation of a circularly light-polarizing plate on a transparent electrode.

CONSTITUTION: An ITO film is formed on a glass substrate 3, and a desired pattern is applied to the film. A transparent electrode 4 is thereby formed. Thereafter, an electron hall injection layer 5 is deposited on the substrate 3 and, then, a luminous layer 6 is deposited thereon. An electron injection and transport layer 7 is, then, deposited on the luminous layer 6. At this stage, a vacuum condition is eliminated and a deposition source for both silver and magnesium is prepared. Then, a bath is again evacuated for the co-deposition of silver and magnesium, thereby forming a cathode 8. The organic EL element so formed is taken out from the vacuum bath, and sealed whenever necessary for the prevention of deterioration. Then, a circularly light-polarizing plate is bonded to a linear polarizing plate 1, so as to keep the optical axis of a phase substrate 2 at 45 degrees with the polarization axis of the polarizing plate, and the product so prepared is bonded to the substrate 3.



LEGAL STATUS

[Date of request for examination] 31.03.2000

[Date of sending the examiner's decision of rejection] 19.11.2002

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] Organic electroluminescence devices characterized by installing a circular polarization of light plate in a transparent electrode side in the organic electroluminescence devices by which the organic thin film was pinched by inter-electrode [of a couple at least with transparent one side].
[Claim 2] ** at least -- a transparence base, an anode plate, an organic luminous layer, cathode, or ** -- at least -- a transparence base -- an anode plate, a hole-injection transporting bed, an electron injection transport luminous layer, cathode, or ** -- at least -- a transparence base -- In the organic electroluminescence devices constituted at least in order of a transparence base, an anode plate, a hole-injection transporting bed, an organic luminous layer, an electron injection transporting bed, and cathode an anode plate, a hole-injection transport luminous layer, an electron injection transporting bed, cathode, or ** -- Organic electroluminescence devices characterized by forming a circular polarization of light plate in the front face of an anode plate side transparence base (they are an anode plate and an opposite hand in the front face of a transparence base).

[Translation done.]

* NOTICES *
JPO and NCIPI are not responsible for any
damages caused by the use of this translation.
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the organic electroluminescence devices (it is written as an organic EL device below) used for the flat-surface light source or a flat-surface display.
[0002]
[Description of the Prior Art] According to the 25th volume 773 pages of Japanese journal OBU applied physics (1986), the applied physics Letters 51st volume 913 pages (1987), JP,57-51781,A public relations, JP,59-194393,A public relations, JP,63-264692,A public relations, the JP,63-295696,A public relations, etc., generally, an organic EL device is made as follows. A transparent electrode (ITO) is formed by the approach of vacuum evaporationo, a SUPPATTA ring, etc. on transparence insulation

substrates, such as glass and a resin base. subsequently, poly mol FIRIN represented by copper phtalo SHINIAN, N, and N' - diphenyl-N and N' -- the - screw (3-methylphenyl) -1 and 1' -- a layer with a thickness of 1 micrometer or less is formed by the approach of vacuum evaporationo and others, and let triphenylamine derivatives, such as the - biphenyl -4 and a 4 '- diamine, 1, 1'-screw (4-G Para-tolylamino phenyl) cyclohexane, be hole-injection transporting beds. Next, on this hole-injection transporting bed, a luminous layer with a thickness of 1 micrometer or less is formed with organic fluorescent substances, such as a quinolinol complex, a tetra-phenyl butadiene, and a quinolinol complex that doped Quinacridone. Furthermore, electron injection transporting beds, such as an OKISA diazole derivative, are formed by the thickness of 1 micrometer or less if needed. The laminating of simple substance metals, such as magnesium aluminum in JUUMU, or magnesium and silver, and the aluminum magnesium alloy is carried out to the last by the approach of vacuum evaporationo and others, and an electrode is formed. Thus, an electron is poured into an organic layer for an electron hole from cathode from an anode plate, the organic substance emits light by recombination of an electron hole and an electron, and the made organic EL devices are 10,000 Cd/m2, when a transparent electrode is made into an anode plate and the direct current voltage of 3-20V is impressed by using magnesium etc. as cathode. The above brightness has also been obtained and the intensity level utilizable enough as a display device or a component for lighting is reached. However, since the thickness of the organic compound used for an organic EL device is very thin, outdoor daylight reaches even to a cathode on the back. The electrode surface formed by vacuum evaporationo etc. is dramatically smooth, and a mirror plane. Therefore, since an external scene is reflected to a component and an external scene and a display lap by the reflected light from the electrode of the light from the outside, there is a fault which will become very hard to see.

[0003]

[Problem(s) to be Solved by the Invention] It was made in order that this invention might solve the above-mentioned trouble, and as the light reflected from the tooth-back cathode does not come out outside, it is made for the purpose of offering a legible organic EL device.

[0004]

[The means for solving invention] namely, this invention -- ** -- at least -- a transparence base, an anode plate, an organic luminous layer, cathode, or ** -- at least -- a transparence base -- an anode plate, a hole-injection transporting bed, an electron injection transport luminous layer, cathode, or ** -- at least -- a transparence base -- In the organic EL device constituted at least in order of a transparence base, an anode plate, a hole-injection transporting bed, an organic luminous layer, an electron injection transporting bed, and cathode an anode plate, a hole-injection transport luminous layer, an electron injection transporting bed, cathode, or ** -- It is the organic EL device characterized by forming a circular polarization of light plate in the front face of an anode plate side transparence base (they are an anode plate and an opposite hand in the front face of a transparence base).

[0005] Drawings (1) are a circular polarization of light plate, a transparence substrate, an anode plate, a hole-injection transporting bed, an organic luminous layer, an electron injection transporting bed, and the example constituted in order of cathode as an example of representation of the organic EL device concerning this invention. The circular polarization of light plate consists of a linearly polarized light plate and a phase contrast plate. The circle deflection of clockwise twining and counterclockwise twining can be acquired by leaning **45 degrees of angles of the deflection shaft of a linearly polarized light plate, and the optical axis of a phase contrast plate to make. The description of a circle deflection is that **** of a circle deflection changes by reflecting. That is, it becomes a **** deflection by reflecting a **** deflection, and a **** deflection will turn into a right deflection, if it reflects. Carrying out incidence from the outside, it becomes the circle deflection of the right or the left, it is reflected by the metal electrode on the back, and the light which passed the circular polarization of light plate advances toward the component exterior. however, **** of the light which carried out incidence, and an opposite direction -- **** -- **** -- since it is and a circular polarization of light plate does not let the

reflected light pass, the scene of the exterior by echo will not be in sight.

[0006] When not installing a circular polarization of light plate, since it is reflected as it is and an extraneous light goes into an eye, an external scene will be reflected as it is. When a pattern display is carried out with an organic EL device as a result or it indicates by the matrix, the scene of a display and the exterior laps, and a display is dramatically hard to see. However, if a circular polarization of light plate is installed like ****, in order that a circular polarization of light plate may cut the reflected light by the cathode, an external scene disappears, and only the pattern which it is going to display with an organic EL device will go into an eye, and can use it as a very legible display device. As for the maximum front face of an organic EL device, at this time, a display comes to look well further by performing non-glare processing currently performed in the liquid crystal display.

[0007]

[Example] Hereafter, the example of the organic EL device of this invention is explained according to drawing (1). An ITO thin film is attached to a glass substrate (3) by the approach of vacuum evaporationo or others, desired patterning is performed, and a transparent electrode (4) is formed. This substrate is often washed, and it installs in an after [desiccation] vacuum tub, and is a copper phthalocyanine as a hole-injection transporting bed (5) 1000 It vapor-deposits and, subsequently is 8-aluminum kino rate as a luminous layer (6) 500 It vapor-deposits. further -- as an electron injection transporting bed (7) -- 2- (4'-t-buthylphenyl 9-5-(4'-biphenyl)- the 500 vacuum evaporationo of 1, 3, and 4-OKISA diazole is done.) A vacuum is broken here, the source of vacuum evaporationo of silver and magnesium is prepared, and the inside of a tub is again made into a vacuum. Vapor codeposition is performed using the evaporation rate of silver and magnesium as 1:10, and cathode (8) is formed. Thus, the created organic EL device is closed in order to protect degradation from the inside of a vacuum tub ejection and if needed. In this condition, since the thickness of the vapor-deposited organic material is thin, the metallic luster of cathode is in sight as it is. Therefore, the component has become like a mirror. Next, although a circular polarization of light plate is installed, a circular polarization of light plate is a linearly polarized light plate (for example, made by adhering or pasting up the optical axis of a phase contrast plate (2) (for example, phase contrast plate SEF[by Sumitomo Chemical / Co., Ltd. / Co., Ltd.]-057M grade) on the polarizing plates (SG-1812AP etc.) (1) by Sumitomo Chemical [Co., Ltd.] Co., Ltd. with a binder or adhesives, so that the polarization shaft of a polarizing plate and the include angle of 45 degrees may be made.). Thus, the created circular polarization of light plate is adhered or pasted up on a glass substrate (3). Thus, by installing a circular polarization of light plate in the glass substrate front face of an organic EL device, the reflected light from a tooth-back metal electrode was intercepted, the external scene could be prevented from being reflected, and the component very legible even place [bright] was able to be obtained.

[0008]

[Effect of the Invention] As explained above, with the flat-surface light source and the light emitting device for a display, it is very useful, a display becomes very legible, the fault of the conventional organic EL device can be compensated with the organic EL device of this invention, and the industrial utility value is high.

[Translation done.]

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the mimetic diagram of an organic EL device.
[Description of Notations]
1 Linearly Polarized Light Plate
2 Phase Contrast Plate
3 Glass Substrate
4 Anode Plate
5 Hole-Injection Transporting Bed
6 Luminous Layer
7 Electron Injection Transporting Bed
8 Cathode

[Translation done.]

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号

特開平8－321381

(43)公開日　平成８年(1996)12月３日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ		技術表示箇所
Ｈ０５Ｂ　33/14			Ｈ０５Ｂ　33/14		
Ｃ０９Ｋ　11/06		9280－4Ｈ	Ｃ０９Ｋ　11/06	Ｚ	

審査請求　未請求　請求項の数２　ＦＤ　（全　３　頁）

(21)出願番号　特願平7－152139

(22)出願日　平成７年(1995)５月26日

(71)出願人　000002071
チッソ株式会社
大阪府大阪市北区中之島３丁目６番32号

(72)発明者　古川　顕治
神奈川県横須賀市久里浜１丁目16番７号

(72)発明者　内田　学
神奈川県横浜市金沢区乙舳町10番２号

(72)発明者　泉澤　勇昇
神奈川県横浜市金沢区乙舳町10番２号

(74)代理人　弁理士　野中　克彦

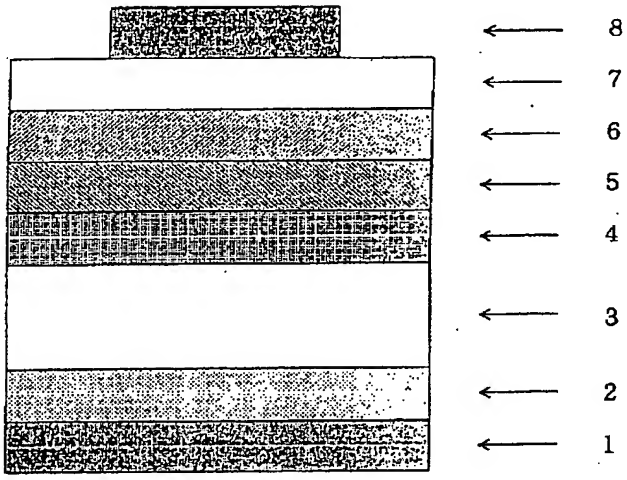
(54)【発明の名称】　有機電界発光素子

(57)【要約】

【目的】　背面陰電極から反射した光が外部に出ないようにした見易い有機ＥＬ素子の提供。

【構成】　少なくとも一方が透明な一対の電極間に有機薄膜が挟持された有機電界発光素子の透明電極側に円偏光板を設置した有機電界発光素子。

【効果】　表示が見易く、平面光源やディスプレイ用発光素子として有用なものが得られた。



1

【特許請求の範囲】

【請求項１】　少なくとも一方が透明な一対の電極間に有機薄膜が挟持された有機電界発光素子において透明電極側に円偏光板を設置したことを特徴とする有機電界発光素子。

【請求項２】　①少なくとも透明基盤、陽極、有機発光層、陰極または②少なくとも透明基盤、陽極、正孔注入輸送層、電子注入輸送発光層、陰極または③少なくとも透明基盤、陽極、正孔注入輸送発光層、電子注入輸送層、陰極または④少なくとも透明基盤、陽極、正孔注入輸送層、有機発光層、電子注入輸送層、陰極の順で構成される有機電界発光素子において、陽極側透明基盤（透明基盤の表面で陽極と反対側）の表面に円偏光板を設けることを特徴とする有機電界発光素子。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、平面光源や平面ディスプレイに使用される有機電界発光素子（以下有機ＥＬ素子と略記する）に関する。

【０００２】

【従来の技術】有機ＥＬ素子はジャパニーズ・ジャーナル・オブ・アプライドフィジックス第２５巻７７３頁（１９８６年）、アプライド・フィジックス・レターズ第５１巻９１３頁（１９８７年）、特開昭５７－５１７８１号広報、特開昭５９－１９４３９３号広報、特開昭６３－２６４６９２号広報、特開昭６３－２９５６９６号広報等によれば、一般的には次のようにして作られる。ガラスや樹脂基盤等の透明絶縁性基板上に蒸着やスッパッタリング等の方法により透明電極（ＩＴＯ）を形成する。次いで銅フタロシニアンに代表されるポリモルフィリン類、Ｎ，Ｎ’－ジフェニル－Ｎ，Ｎ’－ビス（３－メチルフェニル）－１，１’－ビフェニル－４，４’－ジアミンや１，１’－ビス（４－ジ－パラ－トリルアミノフェニル）シクロヘキサン等のトリフェニルアミン誘導体を蒸着その他の方法により厚さ１μｍ以下の層を形成し、正孔注入輸送層とする。次にこの正孔注入輸送層の上に、キノリノール錯体、テトラフェニルブタジエン、キナクリドンをドープしたキノリノール錯体などの有機蛍光体で１μｍ以下の厚さの発光層を形成する。さらに必要に応じてオキサジアゾール誘導体等の電子注入輸送層を１μｍ以下の厚みで形成する。最後にマグネシウム・アルミニウム・インジュウム等の単体金属もしくはマグネシウム・銀、アルミニウム・マグネシウム合金を蒸着その他の方法により積層して、電極を形成する。このようにして作った有機ＥＬ素子は、透明電極を陽極とし、マグネシウム等を陰極として３～２０Ｖの直流電圧を印加すると、陽極から正孔が、陰極から電子が有機物層に注入され、正孔と電子の再結合により有機物が発光し１０，０００Ｃｄ／m^2 以上の輝度を得ることもできており、表示素子あるいは照明用素子として十

2

分実用化できる輝度レベルに達している。しかし、有機ＥＬ素子に使用する有機化合物の膜厚は非常に薄いため、外光が背面の陰電極まで到達する。蒸着等により形成した電極表面は非常に平滑で、鏡面となっている。したがって、外部からの光の電極からの反射光により、外部の景色が素子に写ってしまい、外部の景色と表示が重なるために非常に見にくいものになる欠点がある。

【０００３】

【発明が解決しようとする課題】本発明は、上記の問題点を解決するためになされたもので、背面陰電極から反射した光は外部に出ないようにして、見易い有機ＥＬ素子を提供することを目的としてなされたものである。

【０００４】

【発明を解決するための手段】すなわち本発明は、①少なくとも透明基盤、陽極、有機発光層、陰極または②少なくとも透明基盤、陽極、正孔注入輸送層、電子注入輸送発光層、陰極または③少なくとも透明基盤、陽極、正孔注入輸送発光層、電子注入輸送層、陰極または④少なくとも透明基盤、陽極、正孔注入輸送層、有機発光層、電子注入輸送層、陰極の順で構成される有機ＥＬ素子において、陽極側透明基盤（透明基盤の表面で陽極と反対側）の表面に円偏光板を設けることを特徴とする有機ＥＬ素子である。

【０００５】図（１）は本発明に係わる有機ＥＬ素子の代表例として円偏光板、透明基板、陽極、正孔注入輸送層、有機発光層、電子注入輸送層、陰極の順で構成した例である。円偏光板は直線偏光板と位相差板からなっている。直線偏光板の偏向軸と位相差板の光軸とのなす角を±４５°傾けることにより右巻きおよび左巻きの円偏向を得ることが出来る。円偏向の特徴は反射することにより円偏向のむきが変わることである。すなわち、右円偏向は反射することにより左円偏向となり、左円偏向は反射すると右偏向となる。外部から入射し、円偏光板を通過した光は右または左の円偏向となり、背面の金属電極に反射されて、素子外部に向かって進行する。しかし、入射した光と反対方向の円偏偏向なっているので、円偏光板が反射光を通さないので、反射による外部の景色が見えないことになる。

【０００６】円偏光板を設置しない場合には、外部光がそのまま反射されて目に入るために外部の景色がそのまま写ってしまう。その結果有機ＥＬ素子でパターン表示をしたり、マトリックス表示をした場合に表示と外部の景色が重なり、表示が非常に見にくい。しかし上述の如く円偏光板を設置すると陰電極による反射光を円偏光板がカットするために、外部の景色は見えなくなり、有機ＥＬ素子で表示しようとするパターンのみが目に入ることになり、非常に見易い表示素子とすることができる。このときに、有機ＥＬ素子の最表面は液晶ディスプレイにおいて行われているノングレア処理を施すことにより、さらに表示が良く見えるようになる。

3

【０００７】

【実施例】以下、本発明の有機ＥＬ素子の実施例を図（１）にしたがって説明する。ガラス基板（３）に蒸着やその他の方法によりＩＴＯ薄膜をつけ、所望のパターニングを施し透明電極（４）を形成する。この基板をよく洗浄し、乾燥後真空槽内に設置し、正孔注入輸送層（５）として銅フタロシアニンを１０００　蒸着し、次いで発光層（６）として８－アルミキノレートを５００　蒸着する。さらに電子注入輸送層（７）として２－（４’－ｔ－ブチルフェニル９－５－（４’－ビフェニル）－1，３，４－オキサジアゾールを５００　蒸着する。ここで真空を破り、銀とマグネシウムの蒸着源を用意し、再び槽内を真空にする。銀とマグネシウムの蒸着速度を１：１０として共蒸着を行い陰極（８）を形成する。このようにして作成した有機ＥＬ素子を真空槽内から取り出し、必要に応じて、劣化を防ぐために封止をする。この状態では蒸着した有機材料の膜厚が薄いために陰極の金属光沢がそのまま見える。そのために素子は鏡のようになっている。次に円偏光板を設置するのであるが、円偏光板は直線偏光板（例えば住友化学工業（株）社製偏光板（ＳＧ－１８１２ＡＰ等）（１）に粘着剤や接着剤で位相差板（２）（例えば住友化学工業（株）社製位相差板ＳＥＦ－０５７Ｍ等）の光軸を偏光板の偏光

4

軸と４５°の角度をなすように粘着あるいは接着することにより作られる。このようにして作成した円偏光板をガラス基板（３）に粘着あるいは接着する。このように有機ＥＬ素子のガラス基板表面に円偏光板を設置することにより、背面金属電極からの反射光を遮断して、外部の景色が写らないようにすることができ、明るいところでも非常に見易い素子を得ることが出来た。

【０００８】

【発明の効果】以上説明したように本発明の有機ＥＬ素子は平面光源やディスプレイ用発光素子ときわめて有用であり、表示が非常に見易くなり、従来の有機ＥＬ素子の欠点を補うことが出来、その工業的利用価値は高い。

【図面の簡単な説明】

【図１】有機ＥＬ素子の模式図である。

【符号の説明】

1　直線偏光板
2　位相差板
3　ガラス基板
4　陽極
5　正孔注入輸送層
6　発光層
7　電子注入輸送層
8　陰極

【図１】